**Amendments to the Drawings:**

The attached sheets of drawings include changes to Figures 1c, 3a and 4a.

Attachments: Replacement Sheets (3)

Annotated Sheets Showing Changes (3)

## REMARKS

The Office Action of September 24, 2008, has been reviewed and the Examiner's comments carefully considered. The present Amendment amends independent claim 99. No new matter has been added. Support for this amendment can be found throughout the specification and drawings as originally filed. The specification and drawings have also been amended to correct minor informalities as will be discussed in greater detail hereinafter. Claims 58-120 are currently pending in this application and claims 58, 59, 68, 78, 90, 99 and 109 are in independent form.

### Amendments to the Specification

Applicants have amended the specification to conform the headings to standard United States practice. No new matter has been added. Entry of these amendments is respectfully requested.

### Amendments to the Drawings

Figs. 1c, 3a and 4a have been amended herein. Fig. 1c has been amended to insert "(Mcn,Cu)S" into the label of the graph. Fig. 3a has been amended to delete the colon and insert an equal sign into the label of the graph. Fig. 4a has been amended to delete a colon and insert an equal sign therefor in the label of the graph. No new matter has been added.

### Objections to the Claims

Claim 99 stands objected to for minor informalities. Specifically, the Examiner has objected to claim 99 because "CnS" should read "CuS". The Applicants believe that the above amendment to claim 99 overcomes the Examiner's informality objection. Reconsideration of this objection is respectfully requested.

### 35 U.S.C. § 103 Rejections

Claims 58-120 stand rejected under 35 U.S.C. §103(a) for obviousness based upon International Patent Application No. WO 2003/031670 to Murakami et al. (hereinafter "the Murakami application). Claims 58, 59, 61-67, 90 and 92-98 also stand

rejected under 35 U.S.C. §103(a) as being obvious over United States Patent No. 5,078,809 to Kinoshita et al. (hereinafter "the Kinoshita patent") in view of United States Patent No. 6,709,419 to Yoshinaga et al. (hereinafter "the Yoshinaga patent"). In view of the following remarks, the Applicants respectfully request reconsideration of these rejections.

1. Description of the Present Invention

As defined by independent claim 58, the present invention is a bake-hardenable cold rolled steel sheet having excellent formability. The sheet includes, in weight%, 0.003 ~ 0.005 % of C, 0.003 ~ 0.03 % of S, 0.01 ~ 0.1 % of Al, 0.02 % or less of N, 0.2 % or less of P, at least one of 0.03 ~ 0.2 % of Mn and 0.005 ~ 0.2 % of Cu, and the balance of Fe and other unavoidable impurities. When the steel sheet includes one of Mn and Cu, the composition of Mn, Cu, and S satisfies at least one of the following relationships: $0.58*Mn/S \leq 10$ and $1 \leq 0.5*Cu/S \leq 10$, and when the steel sheet comprises both Mn and Cu, the composition of Mn, Cu, and S satisfies the following relationships: $Mn+Cu \leq 0.3$ and $2 \leq 0.5*(Mn+Cu)/S \leq 20$. The steel sheet includes one or more precipitates selected from the group of MnS, CuS, and (Mn, Cu)S having an average size of 0.2 μm or less.

As defined by independent claim 59, the present invention is a bake-hardenable cold rolled steel sheet having excellent formability. The sheet includes, in weight%, 0.003 ~ 0.005 % of C, 0.005 ~ 0.03 % of S, 0.01 ~ 0.1 % of Al, 0.02 % or less of N, 0.2 % or less of P, 0.05 ~ 0.2 % of Mn, and the balance of Fe and other unavoidable impurities. The composition of Mn and S satisfies the following relationship: $0.58*Mn/S \leq 10$; and the steel sheet includes MnS precipitates having an average size of 0.2 μm or less.

As defined by independent claim 68, the present invention is a bake-hardenable cold rolled steel sheet having excellent formability. The sheet includes, in weight%, 0.003 ~ 0.005 % of C, 0.003 ~ 0.025 % of S, 0.01 ~ 0.08 % of Al, 0.02 % or less of N, 0.2 % or less of P, 0.01 ~ 0.2 % of Cu, and the balance of Fe and other

unavoidable impurities. The composition of Cu and S satisfies the following relationship: $1 \leq 0.5*Cu/S \leq 10$; and the steel sheet includes CuS precipitates having an average size of 0.1 μm or less.

As defined by independent claim 78, the present invention is directed to a bake-hardenable cold rolled steel sheet having excellent formability. The sheet includes, in weight%, 0.003 ~ 0.005 % of C, 0.003 ~ 0.025 % of S, 0.01 ~ 0.08 % of Al, 0.02 % or less of N, 0.2 % or less of P, 0.03 ~ 0.2 % of Mn, 0.005 ~ 0.2 % of Cu, and the balance of Fe and other unavoidable impurities. The composition of Mn, Cu, and S satisfies the following relationships: $Mn+Cu \leq 0.3$ and $2 \leq 0.5*(Mn+Cu)/S \leq 20$; and the steel sheet includes MnS, CuS, and (Mn, Cu)S precipitates having an average size of 0.2 μm or less.

As defined by independent claim 90, the present invention is also directed to a method of manufacturing a bake-hardenable cold rolled steel sheet having excellent formability. The method includes the steps of: hot-rolling a steel slab with finish rolling at an $Ar_3$ transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of 1,100 °C or more; cooling the steel sheet at a speed of 200 °C /min or more; winding the cooled steel sheet at a temperature of 700 °C or less and then cold rolling the steel sheet; and continuous annealing the cold rolled steel sheet so as to obtain the cold rolled steel sheet comprising MnS precipitates having an average size of 0.2 μm or less. The steel slab includes, in weight%, 0.003 ~ 0.005 % of C, 0.005 ~ 0.03 % of S, 0.01 ~ 0.1 % of Al, 0.02 % or less of N, 0.2 % or less of P, 0.05 ~ 0.2 % of Mn, and the balance of Fe and other unavoidable impurities, and the composition of Mn and S satisfies the following relationship: $0.58*Mn/S \leq 10$.

As defined by independent claim 99, the present invention is a method of manufacturing a bake-hardenable cold rolled steel sheet having excellent formability. The method includes the steps of: hot-rolling a steel slab with finish rolling at an $Ar_3$ transformation temperature or more to provide a hot rolled steel sheet, after reheating

the steel slab to a temperature of 1,100 ºC or more; cooling the steel sheet at a speed of 300 ºC/min or more; winding the cooled steel sheet at a temperature of 700 ºC or less and then cold rolling the steel sheet; and continuous annealing the cold rolled steel sheet so as to obtain the cold rolled steel sheet comprising CuS precipitates having an average size of 0.2 ㎛ or less. The steel slab includes, in weight%, 0.003 ~ 0.005 % of C, 0.003 ~ 0.025 % of S, 0.01 ~ 0.08 % of Al, 0.02 % or less of N, 0.2 % or less of P, 0.01 ~ 0.2 % of Cu , the balance of Fe and other unavoidable impurities, and the composition of Cu and S satisfies the following relationship: $1 \leq 0.5*Cu/S \leq 10$ in terms of weight.

As defined by independent claim 109, the present invention is a method of manufacturing a bake-hardenable cold rolled steel sheet having excellent formability. The method includes the steps of: hot-rolling a steel slab with finish rolling at an $Ar_3$ transformation temperature or more to provide a hot rolled steel sheet, after reheating the steel slab to a temperature of 1,100 ºC or more; cooling the steel sheet at a speed of 300 ºC/min or more; winding the cooled steel sheet at a temperature of 700 ºC or less and then cold rolling the steel sheet; and continuous annealing the cold rolled steel sheet so as to obtain the cold rolled steel sheet comprising MnS, CuS, (Mn,Cu)S precipitates having an average size of 0.2 ㎛ or less. The steel slab includes, in weight%, 0.003 ~ 0.005 % of C, 0.003 ~ 0.025 % of S, 0.01 ~ 0.08 % of Al, 0.02 % or less of N, 0.2 % or less of P, 0.03 ~ 0.2 % of Mn, 0.005 ~ 0.2 % of Cu, and the balance of Fe and other unavoidable impurities, and the composition of Mn, Cu, and S satisfies the following relationships: $Mn+Cu \leq 0.3$ and $2 \leq 0.5*(Mn+Cu)/S \leq 20$.

2. Summary of the Examiner's Rejection

As stated above, the Examiner has rejected claims 58-120 under 35 U.S.C. §103(a) for obviousness over the Murakami application, and the Examiner has rejected claims 58-120 under 35 U.S.C. §103(a) for obviousness over the Kinoshita patent in view of the Yoshinaga patent.

Regarding the Murakami application, this reference is directed to a steel sheet for a container having a weld. The steel sheet contains, in mass, 0.0050% or less of carbon (C), 0.0060% or less of nitrogen (N) and boron (B) such that the ratio of B/N is within a range from 0.40 to 2.00. The Examiner contends that examples P and Q provided in Table 11 on page 35 teach all of the claimed elements of the present invention except that it has a higher C content and does not teach or suggest MnS and/or CuS having an average size of ≤ 0.2 μm or in the amount of $2x10^8$ precipitates or more per unit area. However, the Examiner further contends that such properties would be expected since the composition and process of making are closely met.

Regarding the combination of the Kinoshita patent and the Yoshinaga patent, the Kinoshita patent discloses a cold-rolled steel sheet containing 0.001-0.003 wt. % C, 0.004 wt. % or less N and 0.03-0.20 wt. % phosphorus (P). The Examiner also admits that the Kinoshita patent fails to teach or suggest MnS having an average size of ≤ 0.2 μm or in the amount of 2x108 precipitates or more per unit area as required by the claimed invention. However, the Examiner argues that such properties would be expected since the composition and process of making are closely met. The Yoshinaga patent is directed to a steel sheet excellent in painting bake hardenability and is provided by the Examiner as allegedly disclosing adding small amounts of molybdenum (Mo) and chromium (Cr) to steel alloys to improve bake hardenability.

3. Non-obviousness of independent claims 58, 59, 68, 78, 90, 99 and 109

The Murakami application, the Kinoshita patent, and the Yoshinaga patent, either considered individually or in combination, fail to teach or suggest the production of MnS and/or CuS precipitates having an average size of ≤0.2 μm or less as required by each of the independent claims.

Regarding the Murakami application, the Examiner contends that examples P and Q provided in Table 11 on page 35 of the Murakami application teach all of the claimed elements of the present invention except that it has a higher C content and does not teach or suggest MnS and/or CuS precipitates having an average size of ≤0.2 μm or in the amount of $2x10^8$ precipitates or more per unit area (see page 3 of the Office Action of September 24, 2008). The Examiner further contends that such

properties would be expected since the composition and process of making are closely met. However, fine precipitates having an average size of ≤0.2 μm cannot be obtained without controlling the Mn, Cu and S amounts to a ratio of the present invention. When the ratio of Mn/S is greater than the range of the present invention, the MnS precipitates have a size greater than 0.2 μm and are reduced in number. Cu serves to further increase the number of precipitates by nucleus creation of the Cu precipitates. Therefore, the CuS precipitates are not produced without adding Cu. In addition, Cu consumes S and accordingly hinders growth of the MnS precipitates, thereby preventing the MnS precipitates from being coarsened. Accordingly, the Murakami application does not ensure an increase in the number of the precipitates since Cu is not added.

Regarding the combination of the Kinoshita patent and the Yoshinaga patent, the Examiner also admits that these references fail to teach or suggest MnS having an average size of ≤0.2 μm or in the amount of $2x10^8$ precipitates or more per unit area as required by the claimed invention (see page 4 of the Office Action of September 24, 2008). The Examiner then argues that such properties would be expected since the composition and process of making are closely met. However, the fine precipitates having an average size of ≤0.2 μm or in the amount of $2x10^8$ precipitates cannot be obtained without controlling the Mn, Cu and S amounts to a ratio of the present invention. Cu, when added, produces fine CuS precipitates, and consumes S effectively to render the MnS precipitates finer. On the contrary, the Kinoshita patent, either alone or in combination with the Yoshinaga patent, fails to produce fine MnS or CuS precipitates or precipitates in the amount of $2x10^8$.

Accordingly, it was discovered by the Applicants that a bake-hardenable cold-rolled sheet comprising the compositions set forth in independent claims 58, 59, 68, 78, 90, 99, and 109 provides the new and unexpected result of the production of MnS and/or CuS precipitates having an average size of ≤0.2 μm or in the amount of $2x10^8$ precipitates or more per unit area. The production of such precipitates yields a bake-hardenable cold-rolled sheet having improved bake hardenability, formability, yield strength, and yield strength-ductility balance.

To further support these statements, Applicants submit herewith a Declaration by Jeong-Bong Yoon. The Declaration evidences the new and unexpected results obtained by the claimed invention.

Accordingly, the bake-hardenable cold-rolled steel sheet of claims 58, 59, 68, and 78 and the method of producing such a sheet as set forth in claims 90, 99, and 109 is not obvious in view of the Murakami application or the combination of the Kinoshita patent and the Yoshinaga patent. Reconsideration of the rejection of claims 58, 59, 68, 78, 90, 99 and 109 is respectfully requested.

Claims 60-67, 69-77, 79-89, 91-98, 100-108 and 110-120 depend from and add further limitations to independent claims 59, 68, 78, 90, 99 and 109 and are believed to be patentable for the reasons discussed hereinabove in connection with independent claim 59, 68, 78, 90, 99 and 109. Reconsideration of the rejection of claims 60-67, 69-77, 79-89, 91-98, 100-108 and 110-120 is respectfully requested.

**Conclusion**

Based on the foregoing amendments and remarks, reconsideration of the rejections and allowance of pending claims 58-120 are respectfully requested.

Respectfully submitted,

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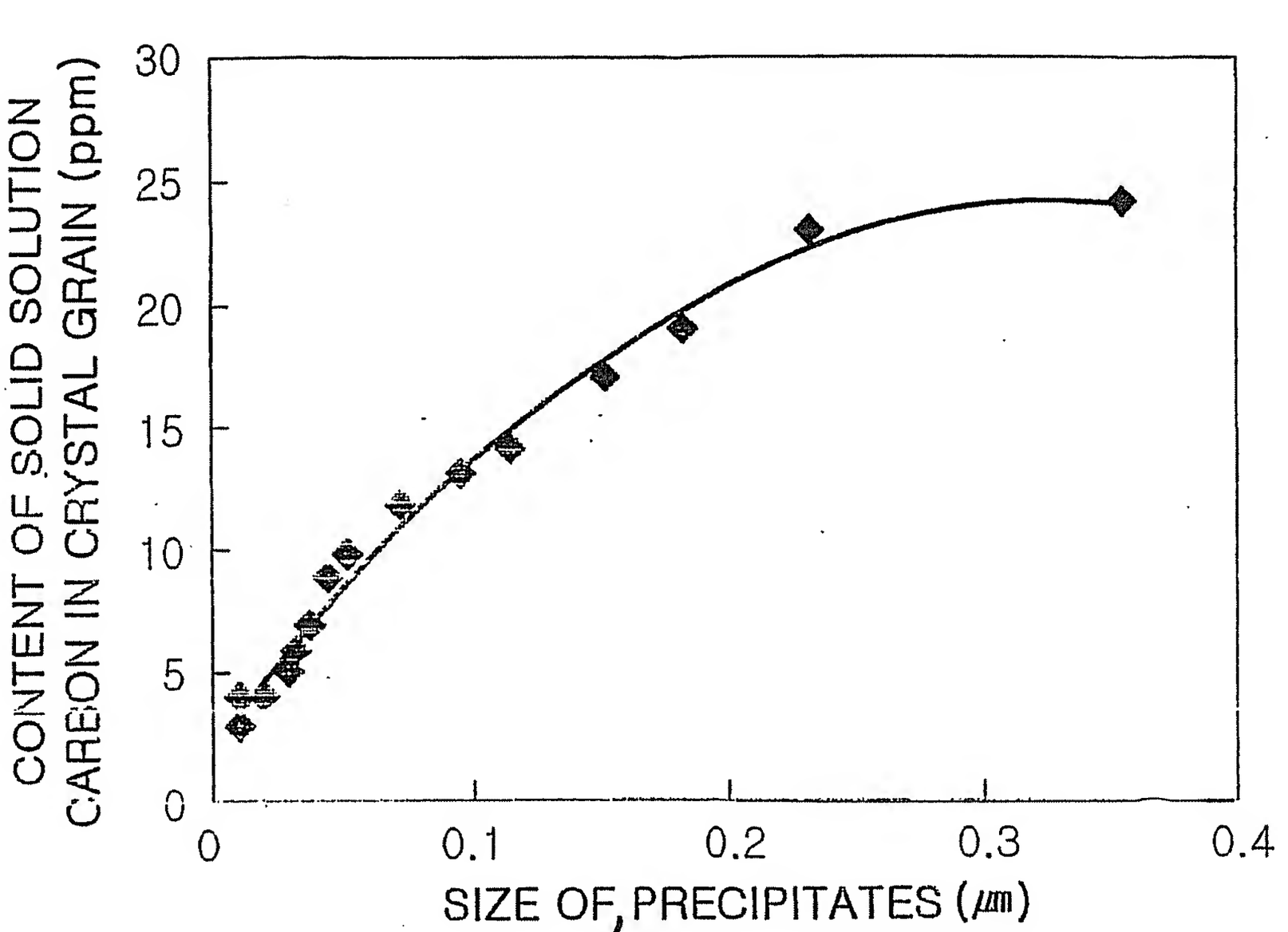


FIG. 1c

insert : (Mn, Cu)S

delete and insert : =

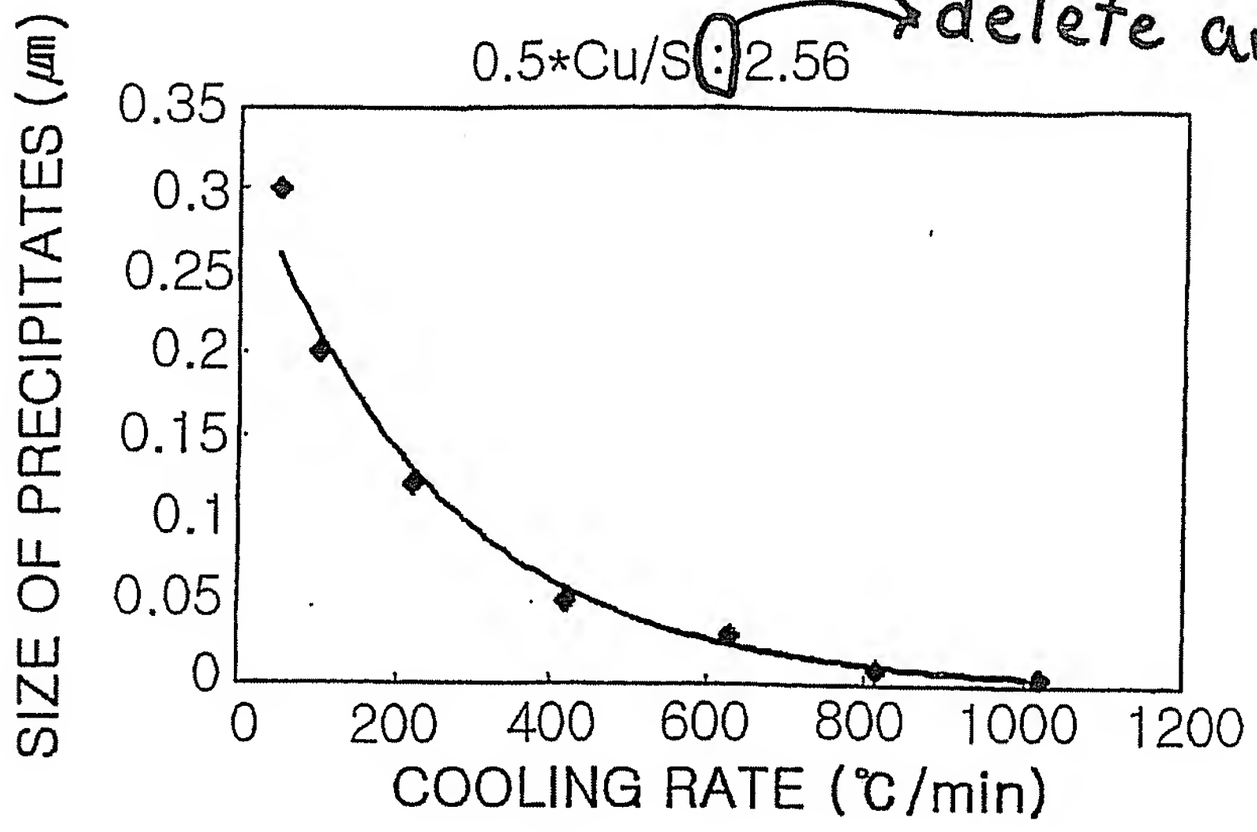


FIG. 3a

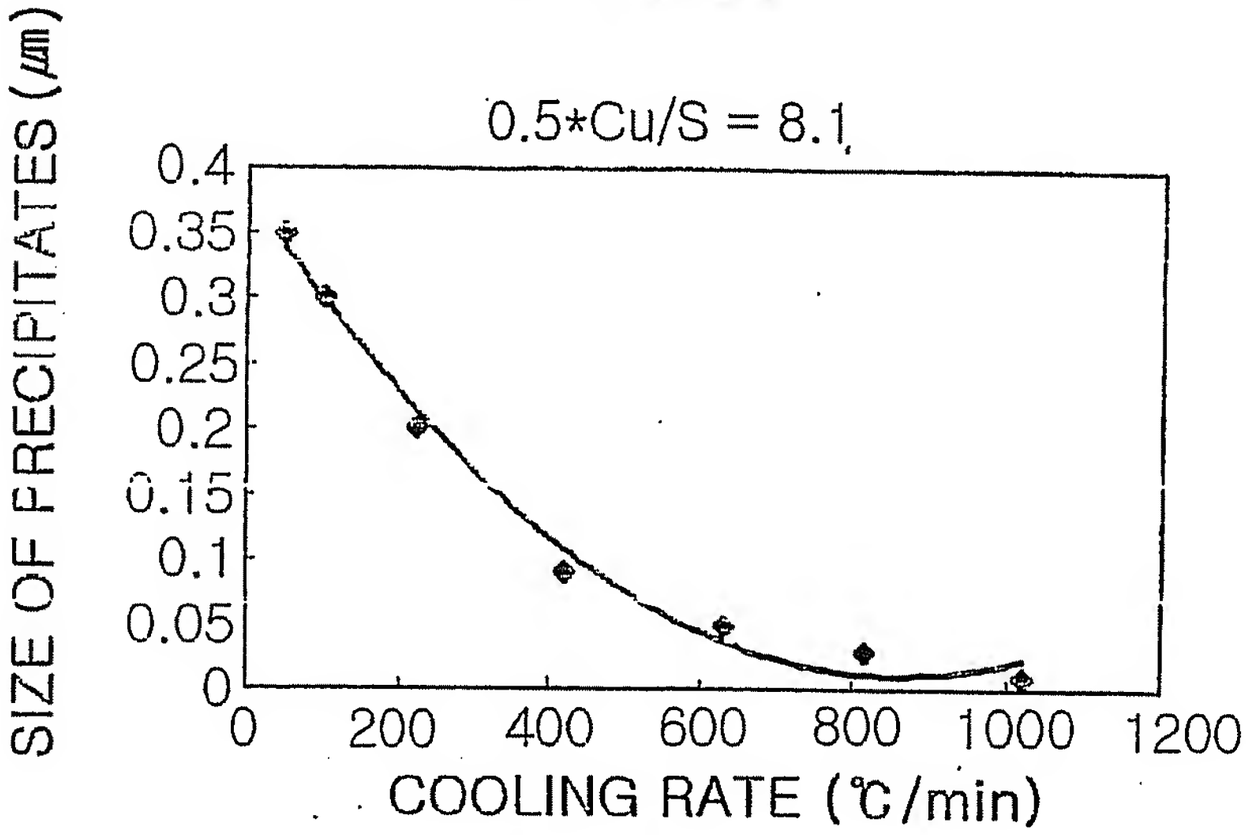


FIG. 3b

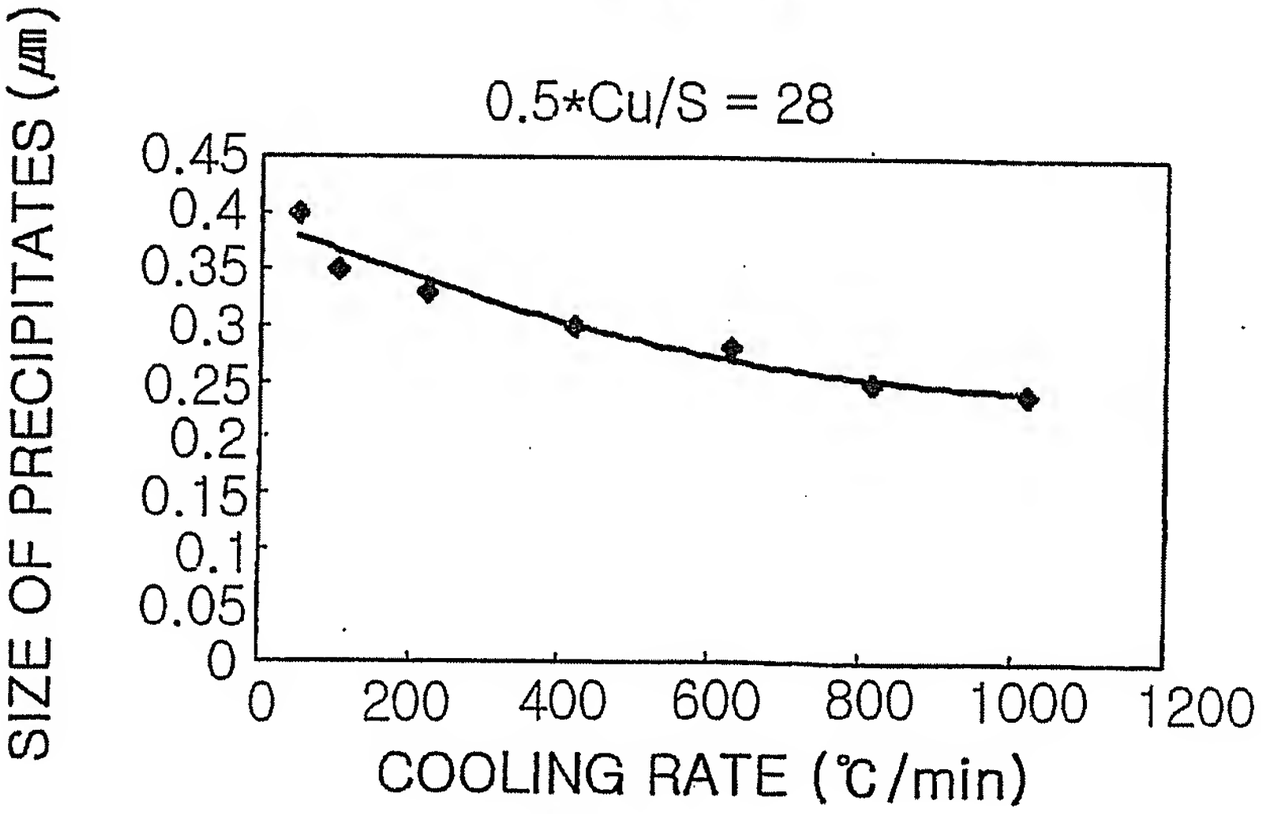


FIG. 3c

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delete and insert: =

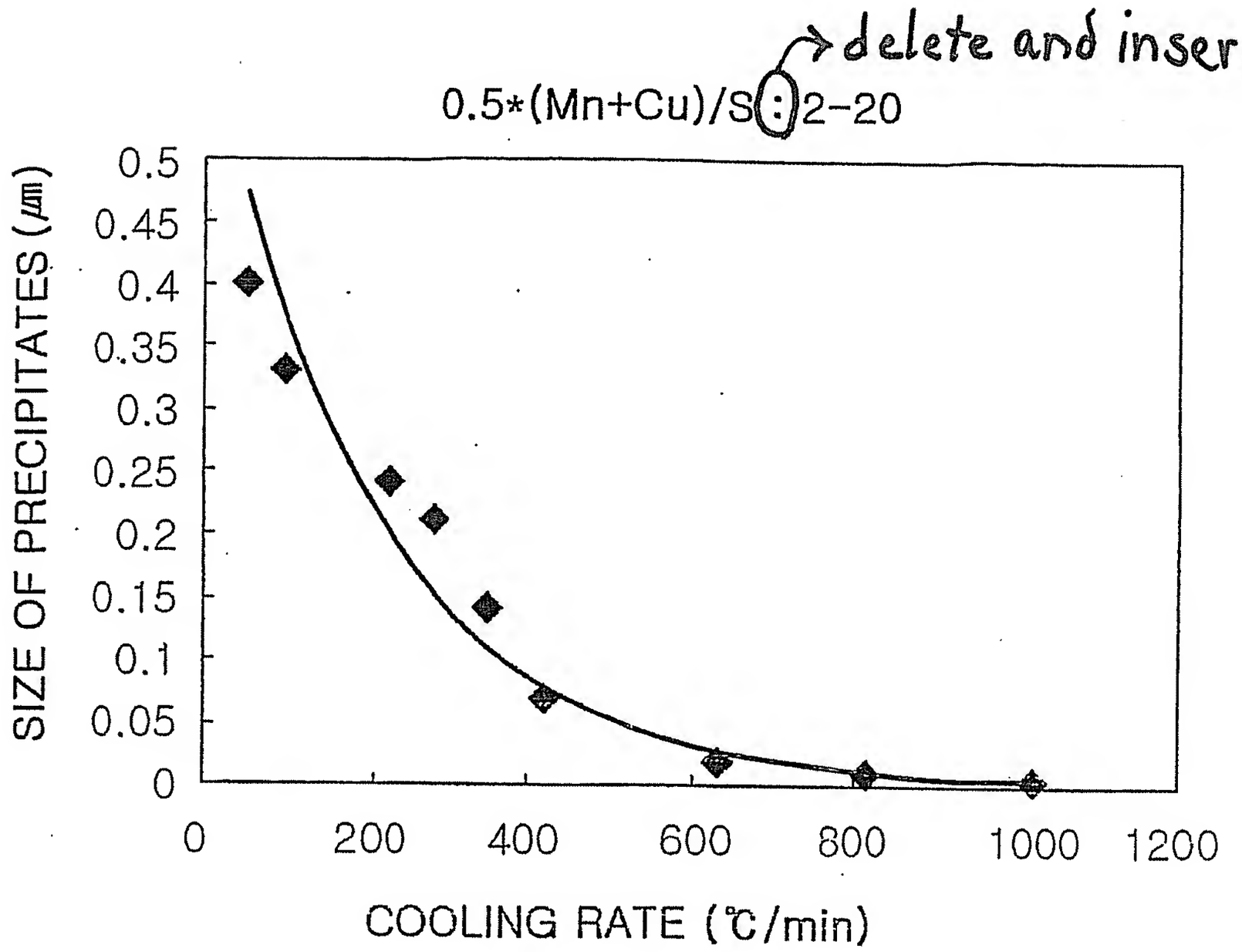


FIG. 4a

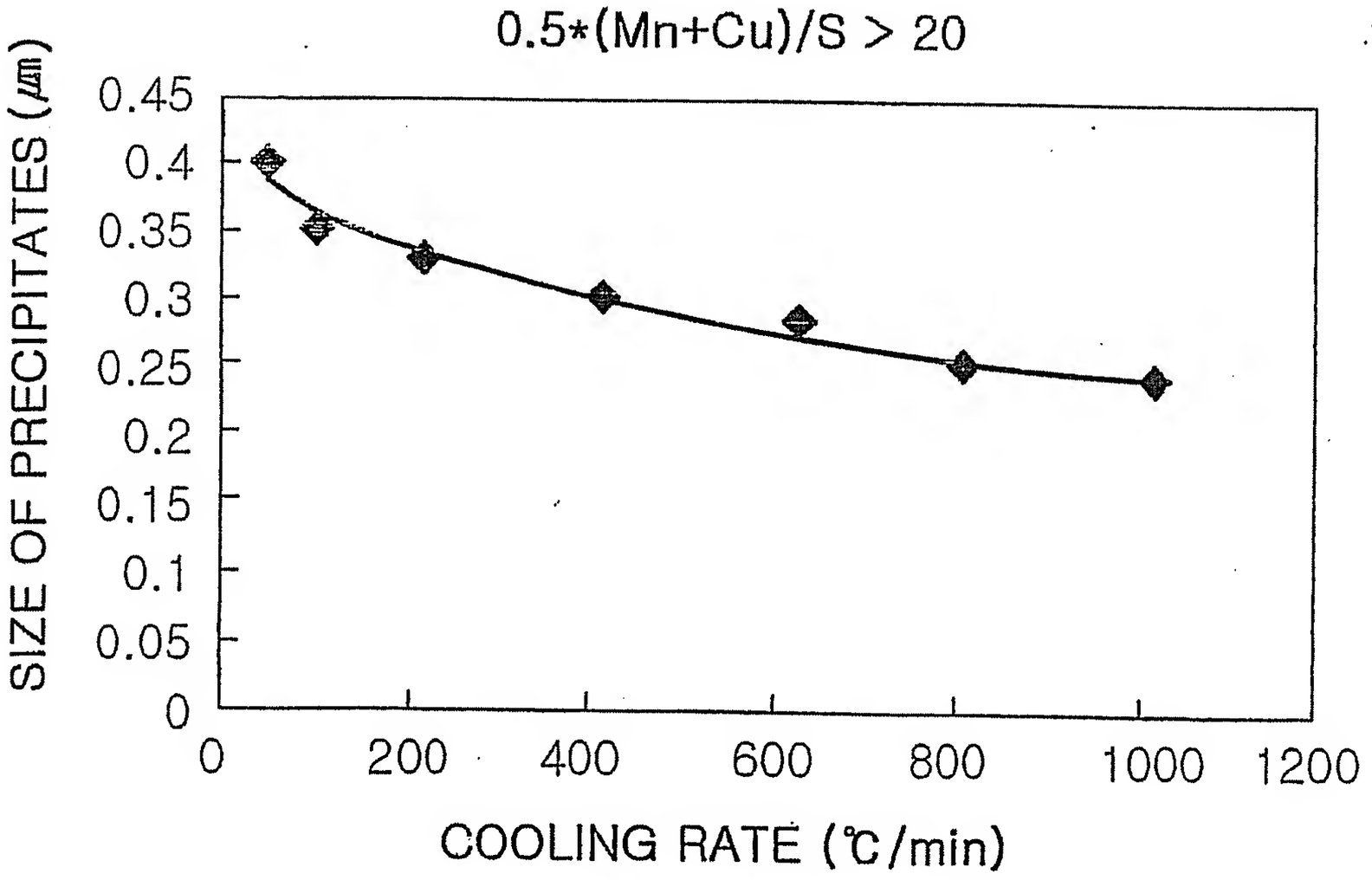


FIG. 4b